3. Find the exact value of each expression in radians.

a) $\arccos\left(-\frac{\sqrt{2}}{2}\right) = \frac{3\pi}{4}$

b) $\arctan\left(-\frac{\sqrt{3}}{3}\right) = \frac{-\pi}{6}$

c) $\operatorname{arccsc}\left(\frac{2\sqrt{3}}{3}\right) = \frac{\pi}{3}$

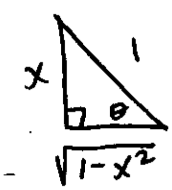
4. Write an equivalent rectangular equation for the polar equation $r = 9\cos\theta$.

$$r^2 = 9r\cos\theta$$

$$\boxed{x^2 + y^2 = 9x}$$

5. Find an equivalent algebraic expression for $\tan(\arcsin(x))$.

1



$$\boxed{\frac{x}{\sqrt{1-x^2}}}$$

6. Find the exact value of $\sin(\alpha - \beta)$ if $\underline{\alpha}$ is in quadrant III with $\sin\alpha = -\frac{2}{3}$ and β is in quadrant I with $\cos\beta = \frac{3}{5}$.

$\cos\alpha = \frac{-\sqrt{5}}{3}$ $\quad y=-2$, $r=3$, $9 = (-2)^2 + x^2$, $5 = x^2$, $x = -\sqrt{5}$

$\sin\beta = \frac{4}{5}$ $\quad x=3$, $r=5$, $5^2 = 3^2 + y^2$, $25 = 9 + y^2$, $16 = y^2$, $y = 4$

$\sin(\alpha-\beta) =$

$\sin\alpha\cos\beta - \sin\beta\cos\alpha$

$\left(-\frac{2}{3}\right)\left(\frac{3}{5}\right) - \left(\frac{4}{5}\right)\left(-\frac{\sqrt{5}}{3}\right)$

$$\boxed{\frac{-6 + 4\sqrt{5}}{15}}$$

7. Let $z = -2\sqrt{3} + 2i$.

a) Find the trigonometric form of z. Use degree measure.

$r = \sqrt{(-2\sqrt{3})^2 + (2)^2} = \sqrt{12+4} = \sqrt{16} = 4$ $\quad \theta = \tan^{-1}\left(\frac{2}{-2\sqrt{3}}\right) = -30° + 180° = 150°$

$$\boxed{z = 4(\cos 150° + i\sin 150°)}$$

b) Use the trigonometric form to find the square roots of z.

$r^{1/2} = 4^{1/2} = 2$ $\quad \theta = \frac{150}{2} = 75°$ $\quad \frac{360}{2} = 180°$

$$\boxed{\begin{array}{l} z_1 = 2(\cos 75° + i\sin 75°) \\ z_2 = 2(\cos 255° + i\sin 255°) \end{array}}$$

8. Find all real numbers x (in radians) that satisfy the equation $\sin^2(2x) = 3\cos^2(2x)$.

$$\frac{\sin^2(2x)}{\cos^2(2x)} = \frac{3\cos^2(2x)}{\cos^2(2x)}$$

$$\sqrt{\tan^2(2x)} \pm\sqrt{3}$$

$$\tan(2x) = \pm\sqrt{3}$$

$$\frac{2x}{2} = \frac{\frac{\pi}{3} + \pi k}{2} \qquad 2x = -\frac{\pi}{3} + \pi k$$

$$\boxed{x = \frac{\pi}{6} + \frac{\pi}{2}k \qquad x = -\frac{\pi}{6} + \frac{\pi}{2}k}$$

9. Find the exact value of the following expression and simplify your answer: $1 - 2\sin^2(22.5°)$.
Hint: You will need to use an identity.

$$1 - 2\sin^2(22.5°) = \cos 45° = \boxed{\frac{\sqrt{2}}{2}}$$

10. Let $z = 36\left(\cos\left(\frac{1}{8}\pi\right) + i\sin\left(\frac{1}{8}\pi\right)\right)$ and $w = 9\left(\cos\left(\frac{3}{8}\pi\right) + i\sin\left(\frac{3}{8}\pi\right)\right)$. Write the expression $\frac{z}{w}$ in the form $a + bi$. Give exact values, not decimal approximations.

$$\frac{36\left(\cos\frac{\pi}{8} + i\sin\frac{\pi}{8}\right)}{9\left(\cos\frac{3}{8}\pi + i\sin\frac{3\pi}{8}\right)} = 4\left(\cos\left(\frac{\pi}{8} - \frac{3\pi}{8}\right) + i\sin\left(\frac{\pi}{8} - \frac{3\pi}{8}\right)\right)$$

$$= 4\left(\cos\left(-\frac{\pi}{4}\right) + i\sin\left(-\frac{\pi}{4}\right)\right)$$

$$= 4\left(\frac{\sqrt{2}}{2} - i\frac{\sqrt{2}}{2}\right) = \boxed{2\sqrt{2} - 2\sqrt{2}i}$$

Part II – Calculator

11. Let $\mathbf{v} = \langle 2, -3 \rangle$ and $\mathbf{w} = \langle -1, 5 \rangle$.

a) Find $2\mathbf{v} - \mathbf{w}$.

$$2\langle 2,-3\rangle - \langle -1,5\rangle$$

$$\langle 4,-6\rangle + \langle 1,-5\rangle = \boxed{\langle 5,-11\rangle}$$

b) Determine the magnitudes of $\mathbf{v}$ and $\mathbf{w}$.

$$|v| = \sqrt{2^2 + (3)^2} = \sqrt{4+9} = \sqrt{13}$$

$$|w| = \sqrt{(-1)^2 + (5)^2} = \sqrt{1+25} = \sqrt{26}$$

c) Determine the direction angle of $\mathbf{w}$. Round to the nearest 10^{th} of a degree.

$$\theta = \tan^{-1}\left(\frac{5}{-1}\right) \approx -78.69 + 180° \approx \boxed{101.3°}$$

d) Determine the cosine of the angle between $\mathbf{v}$ and $\mathbf{w}$.

$$v \cdot w = (2)(-1) + (-3)(5) = -2 - 15 = -17$$

$$\cos\theta = \frac{v \cdot w}{|v||w|} = \frac{-17}{\sqrt{13}\sqrt{26}} = \frac{-17}{\sqrt{338}} \approx -.925$$

12. Prove that the following is an identity. Assume that all quantities are defined.

$$\frac{\cos(x+y)}{\sin(x)\cos(y)} = \cot(x) - \tan(y)$$

$$\frac{\cos x \cos y - \sin x \sin y}{\sin x \cos y} = \cot x - \tan y$$

$$\frac{\cos x \cancel{\cos y}}{\sin x \cancel{\cos y}} - \frac{\sin x \sin y}{\sin x \cos y} = \cot x - \tan y$$

$$\frac{\cos x}{\sin x} - \frac{\sin y}{\cos y} = \cot x - \tan y$$

$$\cot x - \tan y = \cot x - \tan y \checkmark$$

13. Two sides and an angle of $\triangle ABC$ are given: $a = 6$, $b = 8$, $\alpha = m\angle A = 40°$. Solve the triangle. Round all answers to two decimal places.

$h = 8\sin 40° = 5.1$

$5.1 < 6 < 8$

so, two triangles

1st Triangle

$$\frac{\sin 40°}{6} = \frac{\sin B}{8}$$

$$B = \sin^{-1}\left(\frac{8\sin 40°}{6}\right)$$

$$\boxed{B \approx 58.99°}$$

$$C = 180° - 40° - 58.99°$$

$$\boxed{C = 81.01°}$$

$$\frac{\sin 81.01°}{c} = \frac{\sin 40°}{6}$$

$$c = \frac{6\sin 81.01°}{\sin 40°} = \boxed{9.22}$$

2nd Triangle

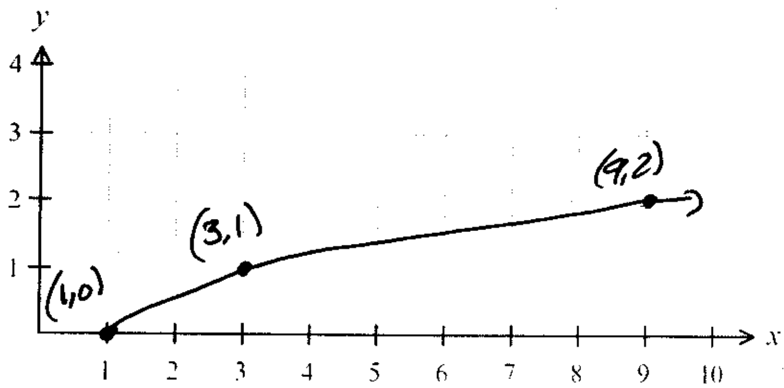
$$B = 180° - 58.99° = \boxed{121.01°}$$

$$C = 180° - 121.01° - 40° = \boxed{18.99°}$$

$$\frac{\sin 18.99°}{c} = \frac{\sin 40°}{6}$$

$$c = \frac{6\sin 18.99°}{\sin 40°} = \boxed{3.04}$$

14. Eliminate the parameter and identify the graph of the parametric equations $x = 2t - 3$, $y = \sqrt{t-2}$. Draw the graph. Label at least three exact points on the graph.



t	$x = 2t-3$	$y = \sqrt{t-2}$
2	(1	0)
3	(3	1)
6	(9	2)

$x = 2t - 3$

$$\frac{x+3}{2} = t$$

$$y = \sqrt{\frac{x+3}{2} - 2}$$

$$y = \sqrt{\frac{x+3}{2} - \frac{4}{2}}$$

$$\boxed{y = \sqrt{\frac{x-1}{2}}}$$

$$\boxed{x \geq 1}$$

$t \geq 2$

square root function

15. Consider the function $y = 3\cos\left(2x + \frac{\pi}{2}\right) - 1$.

$y = 3\cos\left[2\left(x + \frac{\pi}{4}\right)\right] - 1$

a) Find the following quantities.

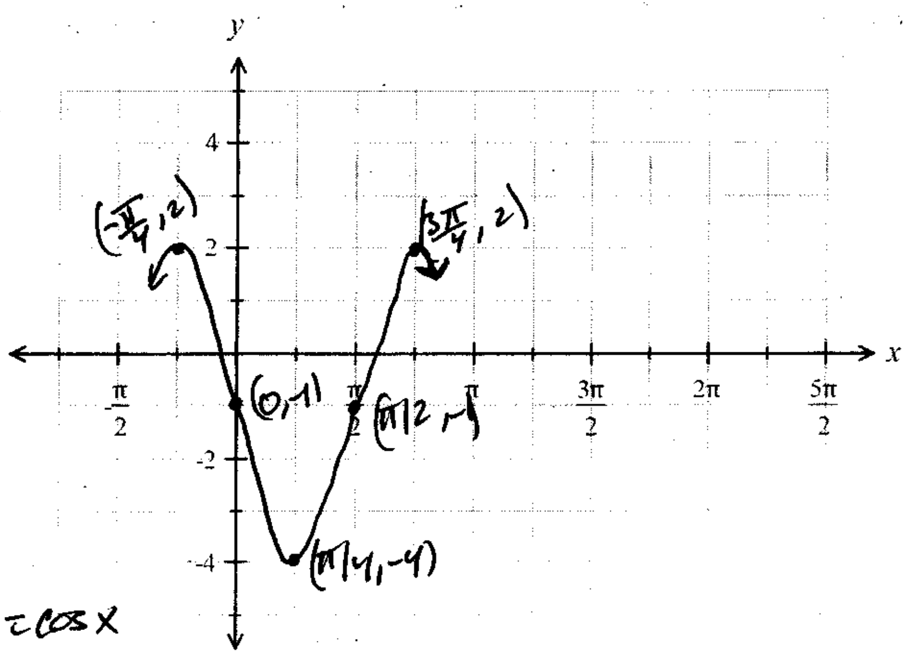
Phase Shift: left $\pi/4$

Period: π

Amplitude: 3

Range: $[-4, 2]$

b) Graph the function. Label the five key points on the graph.



$y = \cos x$

x	y
0	1
$\pi/2$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

$\frac{x}{2} - \frac{\pi}{4}$	$3y - 1$
$(-\frac{\pi}{4}$	$2)$
$(0$	$-1)$
$(\pi/4$	$-4)$
$(\pi/2$	$-1)$
$(3\pi/4$	$2)$

16. The Santa Monica Ferris Wheel has 20 gondolas and a diameter of 90 feet. Please answer the following. Give exact values, not decimal approximations.

a) What is the angle in radians between successive gondolas?

$$\frac{2\pi}{20} = \boxed{\frac{\pi}{10}}$$

b) When the ferris wheel is turning, the gondolas pass by the entry gate at a rate of 1 gondola every 1.6 seconds. What is the ferris wheel's angular velocity in radians per second?

$$\frac{1}{1.6\text{ sec.}} \cdot \frac{2\pi\text{ rad}}{20} = \frac{2\pi\text{ rad}}{32\text{ sec}} = \boxed{\frac{\pi}{16}\text{ rad/sec.}}$$

c) In the movie *1941*, the ferris wheel broke free and rolled down the Santa Monica pier. Assuming it continued to turn at the same angular velocity, how fast was the wheel moving down the pier in feet per second?

$$\frac{\frac{\pi}{16}\text{ rad.}}{1\text{ sec.}} \cdot \frac{45\text{ feet}}{1\text{ rad.}} = \frac{45\pi}{16}\text{ ft/sec.}$$

17. Two sides and the included angle of $\triangle ABC$ are given: $a = 5$, $b = 8$, $\gamma = m\angle C = 40°$. Solve the triangle and give all side lengths and angle measures to two decimal places.

$$c^2 = 5^2 + 8^2 - 2(5)(8)\cos 40°$$

$$c^2 = 27.7164$$

$$c = \sqrt{27.7164} \approx \boxed{5.26}$$

$$\frac{\sin 40°}{5.26} = \frac{\sin A}{5}$$

→ find smaller angle first if using Law of Sines!

$$A = \sin^{-1}\left(\frac{5\sin 40°}{5.26}\right) \approx \boxed{37.66°}$$

$$B = 180° - 40° - 37.66° = \boxed{102.34°}$$

18. Verify the following identity: $\frac{1+\sin(x)}{\cos(x)}+\frac{\cos(x)-\tan(x)}{\sin x}=2\csc(2x)$

$$\frac{1}{\cos x}+\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}-\frac{\tan x}{\sin x}=2\csc(2x)$$

$$\cancel{\frac{1}{\cos x}}+\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}-\cancel{\frac{1}{\cos x}}=2\csc(2x)$$

$$\frac{\sin x}{\sin x}\left(\frac{\sin x}{\cos x}\right)+\left(\frac{\cos x}{\sin x}\right)\frac{\cos x}{\cos x}=2\csc(2x)$$

$$\frac{\sin^2 x+\cos^2 x}{\sin x\cos x}=2\csc(2x)$$

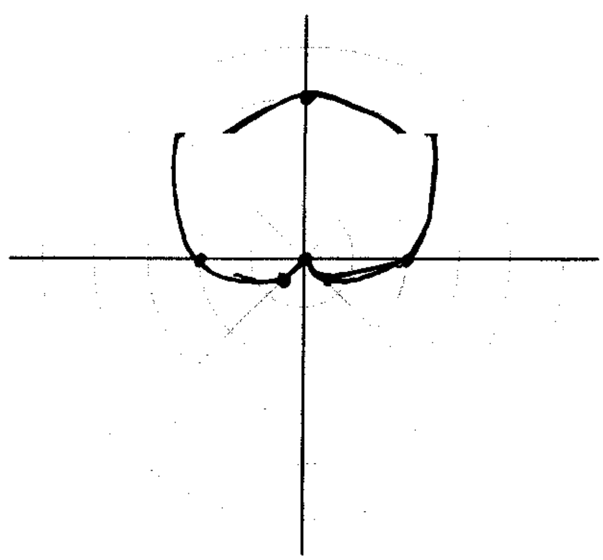
$$\frac{1}{\sin x\cos x}=2\csc(2x)$$

$$\frac{1}{\sin x\cos x}=\frac{2}{\csc(2x)}$$

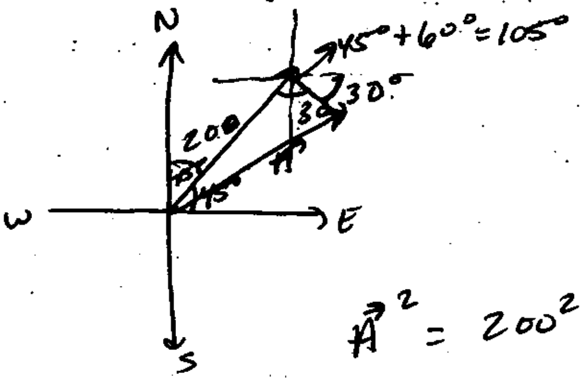
$$\frac{1}{\sin x\cos x}=\frac{2}{2\sin x\cos x}=\frac{1}{\sin x\cos x}$$

19. Complete the table and graph the polar equation $r=2+2\sin(\theta)$.

θ	0	$\frac{1}{4}\pi$	$\frac{1}{2}\pi$	$\frac{3}{4}\pi$	π	$\frac{5}{4}\pi$	$\frac{3}{2}\pi$	$\frac{7}{4}\pi$	2π
r	2	$2+\sqrt{2}$	4	$2+\sqrt{2}$	2	$2-\sqrt{2}$	0	$2-\sqrt{2}$	2



20. A small plane is traveling with an air speed of 200 mph at a bearing of 45°. If a 30 mph wind is blowing at a bearing of 120°, find the ground speed and true bearing of the plane. Round to one decimal place. Your work must include a sketch illustrating the situation.



$$\vec{A}^2 = 200^2 + 30^2 - 2(200)(30)\cos 105°$$

$$\vec{A}^2 = 44005.82854$$

$$\vec{A} = \boxed{209.8 \text{ mph} \rightarrow \text{ground speed}}$$

$$\frac{\sin\theta}{30} = \frac{\sin 105°}{209.8}$$

$$\theta = \sin^{-1}\left(\frac{30 \sin 105°}{209.8}\right) \approx 7.94°$$

$$\text{Bearing: } 45° + 7.94° = \boxed{52.9°}$$

Salt Lake Community College

Math 1060 Final Exam Form A- Spring Semester 2016

Name:__________________________ Instructor:________________________

This exam has two parts. Please carefully read the directions for each part. All problems are of equal point value. No notes, books, cell phones, or any devices that can connect to the internet are allowed.

PART ONE

You must complete this portion of the test **without** using a calculator. For full credit you must show all appropriate work and clearly indicate your answers. After you have finished part one, your instructor will give you the remaining part of the exam. Students are not allowed to have part 1 back after submitting it.

When simplifying answers, it is **not** necessary to rationalize denominators.

1) Given that $\tan(\alpha)=\frac{12}{5}$ and with α in Quadrant III, find the exact values of all the remaining trigonometric functions.

$r=\sqrt{12^2+5^2}=13$

$\cos(\alpha)$ $\frac{5}{13}$

$\sec(\alpha)$ $13/5$

$\sin(\alpha)$ $\frac{12}{13}$

$\cot(\alpha)$ $5/12$

$\csc(\alpha)$ $\frac{13}{12}$

2) Find the exact value of each expression. If the expression is undefined, say so.

a) $\cot\left(\frac{4\pi}{3}\right) = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

b) $\sec(45^\circ) = \sqrt{2}$

c) $\csc(-270^\circ) = 1$

3)

a) Find the exact value in radians.

$\arcsin\left(\frac{\sqrt{3}}{2}\right)$ $\pi/3$

b) Find the exact value in radians.

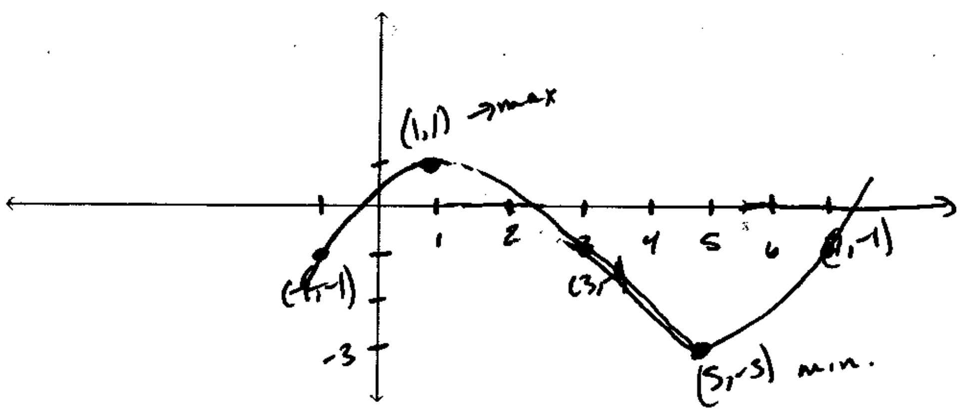
$\operatorname{arcsec}(2)$ $\pi/3$

c) Find the exact value of the expression.

$\cos\left(\arcsin\left(-\frac{5}{13}\right)\right)$ $\boxed{=\frac{12}{13}}$

$X = \sqrt{13^2 - 5^2} = \pm 12$

4) Sketch the graph of $y = 2\sin\left(\frac{\pi}{4}x + \frac{\pi}{4}\right) - 1$. Sketch at least one full cycle. Clearly label the "5 key points": the 3 intersection points between the base line and the graph, and the 2 points corresponding to maxima or minima.

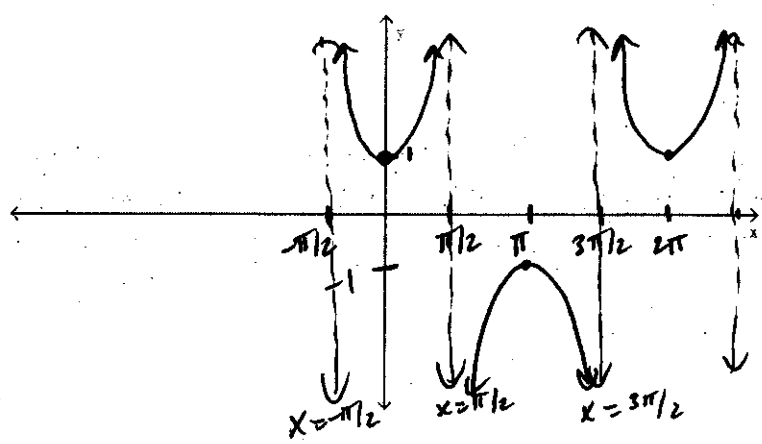


$y = \sin x$ $y = 2\{\sin \frac{\pi}{4}(x+1)] - 1$

x	y
0	0
$\pi/2$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

$\frac{4}{\pi}x - 1$	$2y-1$
-1	-1
1	1
3	-1
5	-3
7	-1

5) Sketch the graph of $y = \sec(x)$. Sketch at least one full cycle. Accurately label the asymptotes and x-intercepts. State the domain of the function.



$y = \sec x$

x	y
0	1
π/2	und.
π	-1
3π/2	undef.
2π	1

Domain: $\{x \mid x \neq \pi/2\, k\}$ where k is odd integers.

or $\boxed{\{x \mid x \neq \pi/2 + \pi k\}}$

6) Fill in the blanks to complete the identity.

$\sin(2\theta) =$ $2\sin\theta\cos\theta$

$\cos(2\theta) =$ $\cos^2\theta - \sin^2\theta$

$\cos(2\theta) =$ $1 - 2\sin^2\theta$

$\cos(2\theta) =$ $2\cos^2\theta - 1$

(Give three different versions for $\cos(2\theta)$)

7) Use appropriate identities to find $\cos(\theta)$ and $\cos(2\theta)$.

$\sin(\theta)=\frac{3}{5}$ where $\frac{\pi}{2}<\theta<\pi$

$\sqrt{5^2-3^2}=4$

$\cos(\theta)$ = $-\frac{4}{5}$

$\cos(2\theta)$ = $\frac{7}{25}$

$1-2\left(\frac{3}{5}\right)^2 = 1-2\left(\frac{9}{25}\right) = 1-\frac{18}{25}$

$= \frac{25}{25}-\frac{18}{25} =$

8) With x in radians, find **ALL** real numbers that satisfy the equation.

$\cos(2x)=-\frac{\sqrt{3}}{2}$

$\frac{2x}{2} = \frac{\frac{5\pi}{6}+2\pi k}{2}$ + $\frac{2x}{2} = \frac{\frac{7\pi}{6}+2\pi k}{2}$

$x = \frac{5\pi}{12} + \pi k$ + $x = \frac{7\pi}{12} + \pi k$

9) Find both square roots of $z=-2+2i\sqrt{3}$. Express your answers in trigonometric form, $r\left[\cos(\theta)+i\sin(\theta)\right]$.

$r = \sqrt{(-2)^2+(2\sqrt{3})^2} = \sqrt{4+12} = \sqrt{16} = 4$

$\theta = \tan^{-1}\left(\frac{2\sqrt{3}}{-2}\right) = -60° + 180° = 120°$ or $\frac{2\pi}{3}$

$4^{1/2} = 2$

$\theta = \frac{120°}{2} = 60°$

$\frac{360°}{2} = 180°$

$z_1 = 2(\cos 60° + i\sin 60°)$

$z_2 = 2(\cos 240° + i\sin 240°)$

or $z_1 = 2(\cos\frac{\pi}{3} + i\sin\pi/3)$

$z_2 = 2(\cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3})$

10) Use De Moivre's Theorem to find $\left(-2+2i\sqrt{3}\right)^3$. Show your work. Express your final answer in rectangular form, $a+bi$.

$r=4 \quad \theta=120^\circ$ or $\frac{2\pi}{3}$

$4^3(\cos(3\cdot120^\circ)+i\sin(3\cdot120^\circ))$

$64(\cos 360^\circ + i\sin 360^\circ)$

$64(1+0i) = \boxed{64}$

11) Prove that the equation $\dfrac{\tan(\theta)+\cot(\theta)}{\sec(\theta)\csc(\theta)}=1$ is an identity.

$\dfrac{\tan\theta+\cot\theta}{\sec\theta\ \csc\theta}=1$

$\dfrac{\dfrac{\sin\theta}{\cos\theta}+\dfrac{\cos\theta}{\sin\theta}}{\dfrac{1}{\cos\theta}\cdot\dfrac{1}{\sin\theta}}=1$

$\dfrac{\cos\theta\sin\theta}{1}\left(\dfrac{\sin\theta}{\cos\theta}+\dfrac{\cos\theta}{\sin\theta}\right)=1$

$\sin^2\theta+\cos^2\theta=1$

$1=1$ ✓

Salt Lake Community College

Math 1060 Final Exam Form A- Spring Semester 2016

Name:________________________ Instructor: ____________________

This exam has two parts. Please carefully read the directions for each part. All problems are of equal point value. No notes, books, cell phones, or any devices that can connect to the internet are allowed.

PART TWO

A NON-computer algebra system calculator is allowed. When directions specify an "exact value" a calculator should not be used.

Work all of the following problems. For full credit you must show all appropriate work and clearly indicate your answers.

12) The radius of one of the bicycle wheels is 13 inches long. How many revolutions per minute is this wheel turning when the bicycle is traveling 35 miles per hour? Round your answer to the nearest integer. Given that 5280 feet = 1 mile.

$$\frac{35\ \cancel{\text{miles}}}{1\ \cancel{\text{hr.}}} \cdot \frac{1\ \cancel{\text{hr.}}}{60\ \text{min}} \cdot \frac{5280\ \cancel{\text{ft}}}{1\ \cancel{\text{mile}}} \cdot \frac{12\ \cancel{\text{in}}}{1\ \cancel{\text{ft.}}} \cdot \frac{1\ \cancel{\text{radian}}}{13\ \cancel{\text{in.}}} \cdot \frac{1\ \text{rev.}}{2\pi\ \cancel{\text{rad.}}}$$

$$\boxed{452\ \text{rev}/\text{min}}$$

13) Given that $b = 45$, $c = 33$, $\beta = 65^\circ$. Solve any triangle(s) that results. Please round your answer to the nearest tenth if necessary.

$b > c$ so, one triangle

$$\frac{\sin 65^\circ}{45} = \frac{\sin C}{33}$$

$$C = \sin^{-1}\left(\frac{33 \sin 65^\circ}{45}\right) = \boxed{41.7^\circ}$$

$$A = 180^\circ - 65^\circ - 41.7^\circ = \boxed{73.3^\circ}$$

$$\frac{\sin 73.3^\circ}{a} = \frac{\sin 65^\circ}{45}$$

$$a = \frac{45 \sin 73.3^\circ}{\sin 65^\circ}$$

$$a = \boxed{47.6}$$

14) Find the following for the vectors $\vec{v}=\langle 10,4\rangle$ and $\vec{w}=\langle -2,5\rangle$. Please simplify your answers and give exact values.

a) $\vec{w}-2\vec{v}$

$\langle -2,5\rangle - 2\langle 10,4\rangle = \langle -2,5\rangle + \langle -20,-8\rangle$

$= \boxed{\langle -22,-3\rangle}$

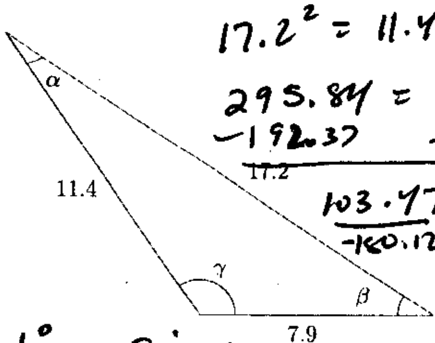
b) $\|\vec{v}+\vec{w}\|$

$|\langle 10,4\rangle + \langle -2,5\rangle| = |\langle 8,9\rangle| = \sqrt{8^2+9^2} = \boxed{\sqrt{145}}$

c) $\vec{v}\bullet\vec{w}$ $\langle 10,4\rangle \bullet \langle -2,5\rangle = (10)(-2)+(4)(5) = -20+20 = \boxed{0}$

15) a) Find all the angles of the following triangle. Please round your answer to the nearest tenth.

SSS: Use Law of cosines! Find largest angle first!



$17.2^2 = 11.4^2 + 7.9^2 - 2(11.4)(7.9)\cos\gamma$

$295.84 = 192.37 - 180.12\cos\gamma$

$-192.37 \quad -192.37$

$103.47 = -180.12\cos\gamma$

$\overline{-180.12} \quad \overline{-180.12}$

$\gamma = \cos^{-1}\left(\frac{103.47}{-180.12}\right) = \boxed{125.1°}$

$\frac{\sin 125.1°}{17.2} = \frac{\sin\alpha}{7.9}$

$\alpha = \sin^{-1}\left(\frac{7.9\sin 125.1}{17.2}\right) \approx \boxed{22.1°}$

$\beta = 180° - 125.1° - 22.1° \approx \boxed{32.8°}$

b) Find the area of the triangle. Please round your answer to the nearest tenth.

$A = \sqrt{s(s-a)(s-b)(s-c)}$

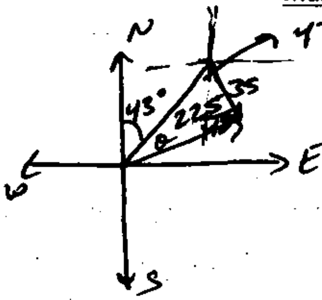
$s = \frac{11.4+7.9+17.2}{2} = 18.25$

$A = \sqrt{18.25(18.25-7.9)(18.25-11.4)(18.25-17.2)}$

$A = \sqrt{18.25(10.35)(6.85)(1.05)}$

$\boxed{A = 36.9\ u^2}$

16) A plane leaves an airport with an airspeed of 225 miles per hour at a bearing of N43°E. A 35 mile per hour wind is blowing at a bearing of S42°E. Find the true speed of the plane, rounded to the nearest mile per hour, and the true bearing of the plane, rounded to the nearest degree. <u>Your work must include a sketch showing the given situation.</u>



$47° + 42° = 89°$

$$\vec{F}^2 = 225^2 + 35^2 - 2(225)(35)\cos 89°$$

$$\vec{F} = \sqrt{51573.1246} \approx \boxed{227.1 \text{ mph - True Speed}}$$

$$\frac{\sin\theta}{35} = \frac{\sin 89°}{227.1}$$

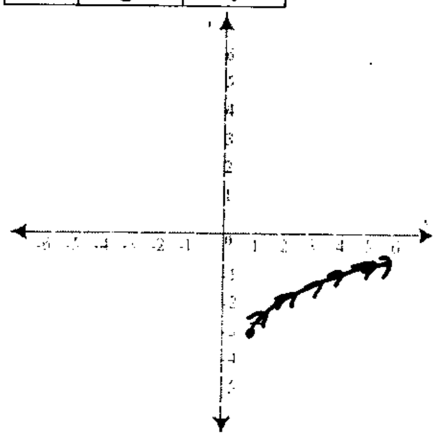
$$\theta = \sin^{-1}\left(\frac{35 \cdot \sin 89°}{227.1}\right) = 8.86°$$

$43° + 8.86° \approx$ $\boxed{\text{Bearing: } 51.9°}$

17) Plot the set of parametric equations. Indicate the orientation imparted on the curve by the parametrization.

$x = t^2 + 1$
$y = t - 3$ for $t \geq 0$

t	x	y
0	1	-3
1	2	-2
2	5	-1



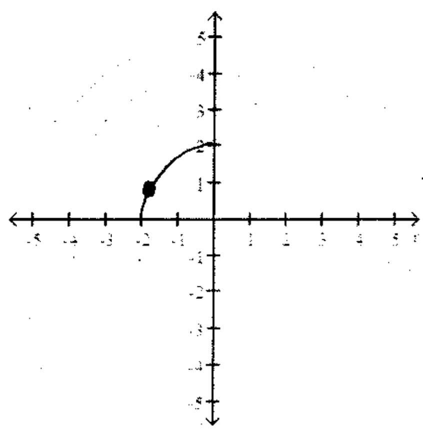
18) A ramp needs to be constructed so that people in wheelchairs can access a building. How long is the ramp if its highest point is 8 feet from the ground and the angle of the ramp must be about 5° measured from the horizontal ground? **Please round your answer to the nearest tenth.**

$\sin 5° = \frac{8}{r}$

$r = \frac{8}{\sin 5°} = \boxed{91.8 \text{ ft}}$

19) Consider the point given in polar coordinates $\left(-2, -\frac{\pi}{6}\right)$.

a) Plot the point.



b) Convert the point from polar coordinates into exact rectangular coordinates.

$x = -2\cos(-\pi/6) = -2\left(\frac{\sqrt{3}}{2}\right) = -\sqrt{3}$

$y = -2\sin(-\pi/6) = -2\left(-\frac{1}{2}\right) = 1$

$\boxed{(-\sqrt{3}, 1)}$

Give two other expressions for the point such that

c) $r > 0$ and $0 \leq \theta \leq 2\pi$

$\boxed{(2, 5\pi/6)}$

d) $r > 0$ and $\theta \leq 0$

$\boxed{(2, -7\pi/6)}$